



Professional Perceptions of Green Roof and its Potential in Malaysian Market

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Abstract

This paper discusses the perceptions towards green roof among Malaysian professionals in built environment industry and its potential in the country's market. A total of 30 projects of local green roofs has been identified and used in this study. Online survey is used as a tool to get feedback from the professionals in the construction discipline, the landscape architect, architect, developer, government officer, urban planner, project executive and also academicians. Based on the findings, most of the professionals perceived that a green roof is beneficial to apply in order to sustain the country development in the future.

Keywords: Green roof; professional involvement; perception; green roof market

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1.0 Introduction

Global warming is a major disaster occurred in the 21st century. Almost all part of the world are inseparable from suffering the effects of global warming phenomenon. Global warming is a result from environmental issues such as urban heat island, increase in energy demands, air pollution and lack of green spaces in urbanized area. In Malaysia, the most crucial environmental issues usually occur in Kuala Lumpur, Pulau Pinang and Johor Bahru. However, Malaysia is targeting to decrease 40% of released carbon dioxide until 2020 (Anandaraj, 2011). In order to achieve the target, the government established Malaysia Green Technology Corporation (GreenTech Malaysia), enactment of legal mechanisms to regulate and enforce green technology. Moreover, the role of every government agency involved in the implementation of green technology in the country is also emphasized. Apart from that, the Ministry of Energy, Green Technology and Water (KeTTHA) take an initiatives by organizing the region's largest green technology exhibition and conference, International GreenTech and Eco Products Exhibition and Conference Malaysia (IGEM) every year since 2010 (3rd IGEM, 2012).

2.0 Literature Review

Green roof is one of the approaches of green technology. Green roof is defined as a vegetated system where plants are planted on the roof using an engineered growing medium laid on certain layers of the system (Tan, 2008; Dunnett et. al, 2011). As the green roof is originally from four-season countries, the climate differs from Malaysia. Therefore, there are various attitudes and reaction towards the technology among the professionals in built environment industry (Rahman et. al, 2013). Therefore, study on the perceptions of green roof must be done in order to understand the current level of understanding and potential market rate of green roof implementation in the country. Result of the study is crucial as professionals in built environment industry are the responsible party to determine the success of green roof in Malaysia. In addition, this study has managed to compile a total of 30 green roof projects throughout the country. The reason for the compilation is to indicate and assess to what extent the implementation of green technology in the country. Thus, the result is a notable finding to be discussed and analysed to determine the direction of future green roof use in Malaysia.

3.0 Methodology

Survey Questionnaire

Survey questionnaire was posted online for 44 days from 21st June 2012 until 2nd August 2012. The professionals were categorized based on their field as shown in Table 1.

Table 1. Percentage of respondent population size

Category	Population size	Response Rate (%)
Landscape Architect	37	30.8
Architect	20	16.7
Academician	14	11.7
Developer	13	10.8
Urban Planner	13	10.8
Government Officer	12	10.0
Project Executive	11	9.2

The number of professionals in accordance to their respective fields is unequal. Based on the findings, the higher populations of respondent's group are the professionals in the Landscape Architecture discipline with 30.8% of the responses. The lowest population is the Project Executive with 9.2% responses.

Survey Form

There are total 11 questions in the survey form; 4 are open-ended questions while the rest are close-ended. The questionnaire consists of three sections. The first section of the survey questionnaire was designed to identify and categorized respondents' discipline. This section aims to determine respondents' familiarity with a green roof and to detect the implementation of green roof in any of their previous projects.

In section two, there are three questions formulated to identify the level of awareness towards green roof among the professionals. Respondents were also asked to indicate any local green roof projects in Malaysia for the purpose of compiling a green roof projects list.

The final section of the survey questionnaire consists of four questions depicting respondent opinion on the potential market for green roof technology implementation in the country.

4.0 Results and Discussions

Professional familiarity with green roof

From the survey, all respondents (100%) have heard about green roof, and 57.5% has used the technology in their previous projects. Table 2 indicates the response rate for each group of professionals and the number of respondents who have implemented green roof system in their projects.

There are 69 professionals who have implemented green roof system in their projects. However, only 28 professionals give the name of the undertaken green roof projects. This situation may due to the professionals wanting to keep the information confidential. Therefore, only 30 green roof projects were noted from the survey and sorted according to its building category. Table 3 indicates the category of building undertaken with green roofs projects by the 28 professional and the types of building under each category.

Table 2. Percentage of professionals who implemented green roof projects

Category	Population size	Number Responded	Response Rate (%)
Landscape Architect	37	34	81.1
Architect	20	16	80.0
Academician	14	0	0
Developer	13	12	92.3
Urban Planner	13	0	0
Government Officer	12	0	0
Project Executive	11	7	63.6
Total	120	69	57.5

Table 3. Category of buildings and types of building undertaken with green roof projects

Category of building	Types of building	Number of project	Percentage (%)	Total number of project	Overall percentage (%)
Residential	Condominium	11	78.6	14	46.7
	Apartment	2	14.3		
	Bungalow	1	7.1		
Commercial	Office	5	38.5	13	43.3
	Hotel	2	15.4		
	Shopping Mall	2	15.4		
	Retail Shop	1	7.7		
	Rooftop Bar	1	7.7		
	Mixed development	1	7.7		
	Integrated Parking	1	7.7		
Institution	Museum	2	66.7	3	10.0
	College	1	33.3		

Based on the findings, there are three categories of buildings undertaken with green roofs projects in the country. The most popular building category is residential buildings (46.7%) while there are few green roof projects under the category of institutional buildings (10%). Many professionals implemented green roof on residential building because, in their opinion, today's societies lack awareness and sense of appreciation for public greenery. Thus, it may cause green roof to be abandoned and vandalized if the design is open public access. Therefore, implementing green roof system and integrating it at residential building may be more reasonable as the green roof will be for private use. The professionals also believe that private designed green roofs are easier to monitor and maintain as the expenses can be outsourced by the residents of the condominium. Another assumption is due to the higher demands of urban dwellers to have their garden in their homes instead of going to a nearby park. The residents may demand to have a sense of ownership by having a garden that could be accessed within a few minute walk from their homes. This concept of living may be one of the factors derived by most of the professionals in implementing green roof systems in the design layout of a residential building. There are three types of residential building. They are condominium, apartment, and bungalow. The most common type of residential

building with green roof projects are condominium (78.6%) while the least is bungalow (7.1%).

There are five types of commercial buildings whereby professionals implemented green roof projects. The details of the types of buildings is in Table 4. For commercial building, office (38.5%) is the most common building with green roof projects while fewer (7.7%) retail shop, rooftop bar, mixed-development and integrated parking use a green roof. The use of green roofs on office building may be due to the high demand from corporate building owners as they acknowledge the positive impacts of the systems in increasing the building property value. The reason may also be due to the current trend in central business district (CBD) area where most of the office building owners would like to participate and show their commitment in supporting the green agenda in Malaysia. Apart from that, besides aesthetical values, green roofs can also be a long term investment which can benefit the owner in the long run.

Museum (66.7%) is the common institutional building having green roof projects among the category of institutions. This is because the designed green roof area within the museum can attract more visitors as it enhances the building uniqueness. Moreover, the return income benefits through the entrance fees of the museum can be used as funds to maintain a green roof. Thirty green roofs projects are recorded successfully from the survey, and the details are in Table 4.

Table 4. Compilation of thirty green roofs project in Malaysia

Green roof Project	Location	Type of green roof	Type of building	Level	Accessibility	Completion Year
Islamic Art Museum	Tasik Perdana, Kuala Lumpur.	Extensive	Museum	One	Public access	1998
Secret Garden	Bandar Utama, Kuala Lumpur.	Intensive	Shopping mall	Seventh	Public access (but on weekend only)	2007
Menara Mesiniaga	Subang Jaya, Selangor.	Extensive	Office	First level of the extended roof area.	Non-accessible	1992
Oasis Ara Aquare	Damansara, Selangor.	Extensive	Retail shop	Second	Accessible	2009
Kiara 9	Mont Kiara, Kuala Lumpur.	Intensive	Condominium	Three and a half (consist of 16 gardens)	Private access	2011
Casa Desa Condominium	Taman Desa, Kuala Lumpur.	Intensive	Condominium	Third	Private access	2008
The Saffron	Sentul East, Kuala Lumpur.	Intensive	Condominium	Fourth	Private access	2008
Riana Green East	Wangsa Maju, Kuala Lumpur.	Intensive	Condominium	Fourth	Private access	2009

The Tamarind	Sentul East, Kuala Lumpur	Intensive	Condominium	Fourth	Private access	2006
Menara Binjai	Ampang, Kuala Lumpur.	Intensive	Office	Every third floor has access to garden terraces, Sky garden at thirty two floors.	Private access	2011
Rice Museum (Laman Padi)	Langkawi, Kedah.	Extensive	Museum	First	Public access	2009
Setia Eco Villa	Shah Alam, Kuala Lumpur.	Intensive	Bungalow	First	Private access	2007
Idaman Residence	Jalan P. Ramlee, Kuala Lumpur	Extensive	Condominium	Thirty four	Private access	2008
Balin Roof Garden Nak Hotel	Sandakan, Sabah.	Intensive	Hotel	Eight	Private access	..
Zouk Club	Kuala Lumpur	Intensive	Rooftop Bar	..	Private access	..
Lot 10	Kuala Lumpur	Intensive	Shopping mall	Eight	Public access	..
Monte Bayu	Cheras, Kuala Lumpur.	Intensive	Apartment	Seventh	Public access	..
Park Seven Condo	Persiaran KLCC, Kuala Lumpur	Extensive	Condominium	..	Private access	2008
Dataran Shamelin	Cheras, Kuala Lumpur	Intensive	Office	First	Public access	..
KLIA covered integrated parking	Sepang, Kuala Lumpur.	Intensive	Integrated parking	Fifth	Public access	1998
Cimb Bank Menara Bumiputera Commerce	Jalan Raja Laut, Kuala Lumpur.	Extensive	Office	First	Non-accessible	..
Malaysian Design Innovation Centre	Cyberjaya, Selangor.	Extensive	College	On top of low-rise building	Private access	2004
Mewah Oil Headquarters	Port Klang, Selangor.	Intensive	Office	Fourth	Private access	2003
Swiss Garden Residences	Jalan Pudu, Kuala Lumpur.	Intensive	Apartment	Sixth	Private access	2011
Hilton & Le Meridien	Jalan Stesen Sentral, Kuala Lumpur.	Intensive	Hotel	..	Private access	2003
Suasana Sentral Condominium	Sentral, Kuala Lumpur.	Intensive	Condominium	Sixth	Private access	2002
Ritze Perdana 2	Petaling Jaya, Selangor.	Intensive	Mixed-development (shops and condominium)	Sixth	Private access	2010
Perdana Exclusive	Petaling Jaya, Selangor.	Intensive	Condominium	Fourth	Private access	..

Green roof Project	Location	Type of green roof	Type of building	Level	Accessibility	Completion Year
Flora Damansara	Petaling Jaya, Selangor.	Intensive	Condominium	Sixth	Private access	..
The Maple	Sentul West, Kuala Lumpur.	Intensive	Condominium	Fifth	Private access	2006

Benefits of having green roofs

The survey questionnaire also indicates professionals' views on the advantages of having green roof. From the survey, professionals have given 16 advantages of having a green roof. The findings summary are in Table5.

Table 5. Summary of green roof advantages

Advantages	Number Responded	Response Rate (%)
Urban Heat Island (UHI) mitigation	72	71.3
Aesthetic value	39	38.6
Alternative green area	29	28.7
Save environment	28	27.7
Storm water management	20	19.8
Thermal comfort	19	18.8
Increase Green Mark point	17	16.8
Soften building façade	17	16.8
Educational opportunities	15	14.9
Natural habitat creation	14	13.9
Energy efficiency	12	11.9
Improve air quality	11	10.9
Increase roof life span	9	8.9
Psychology health	5	5.0
Reduce noise	3	3.0

Based on the summary of green roof advantages, majority of the professionals in the built environment industry agree that green roofs could help to mitigate urban heat island (UHI) in the city (71.3%) compared to other advantages. Only a minority believe that a green roof could reduce the noise of the city's hustle bustle (3%). This may be because the benefit has not been practically studied and proven yet in the Malaysian context. The disparity of views among the professionals is mainly because of the differences of their background knowledge and technical expertise in the industry.

Green roof market in Malaysia

From the findings, 94% of the respondents agree that green roofs have potential marketability in the country. The professionals also stated that the general cost uptake for one square meter intensive green roof is RM400 and above while for extensive is around RM300 to RM400. The expensive construction cost for green roof design becomes one of the barriers for the systems implementation in Malaysia. This may due to the lack of green roof expertise and supplier or manufacturer within the country. In other Asian countries which started implementing green roof in mid 2000s, the cost uptake for one square meter of extensive green roof is approximately between RM100 to RM350. In China, the cost for one square

meter extensive green roof is RM111, in Manila, RM148, and in Hong Kong, the cost is RM320. Singapore started green roof implementation in the early 2000s. However, the cost for one square meter of extensive green roof is similar with Hong Kong, RM320. The cost for one square meter of extensive green roof is much lower in China and Manila compared to Singapore and Malaysia. This may due to the production and manufacturing of most of the materials for green roof are within the country.

The Singapore government initiated incentive schemes to accelerate the growth of green roofs in their country. Therefore, it is possible for Singaporean professionals in the built environment industry to implement the system even though it is expensive. On the other hand, the Malaysian government has started to encourage Malaysian professionals to embrace green technology application in 2009. This effort can be seen through the launching of the National Green Technology Policy with the establishment of the National Green Technology Council in July 2009. Budget 2010 indicated that the Government had allocated RM1.5 billion for companies that supply and utilize green technology through Green Technology Finance Scheme (GTFS). The government also introduces a series of tax incentives that one of them is for Green Building Index (GBI) certified buildings. The incentive scheme provides income tax exemption for the owner of the building and stamps duty exemption for the property buyers according to the specified rules and conditions (Green Tax Incentives for a Sustainable Malaysia, 2010).

5.0 Conclusion

Based on the 30 green roof projects from the survey shows that intensive green roof is the most common green roof being constructed in the country. While the common type of building where most designed with intensive green roof is residential. The survey findings suggest that most of the Malaysian professionals in built environment industry are aware of green roof technology. However, due to certain barriers led to less interest to use the system. The barriers including lack of knowledge and technical expert, expensive cost of green roof and green roof application techniques are not widely disseminated or spread among professionals. Therefore, all parties in the industry and government body have the responsibility to promote green roof system as one of the approaches for green technology application in the country. Thus in return, it could help to accelerate the marketability and progress of green roof in the country.

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